

BOTANY OF THE INTERMOUNTAIN REGION—II.
LESQUERELLA

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Intermountain field study in the genus *Lesquerella* over the past few years had made necessary the earlier review of species of the *L. utahensis* group (Maguire, 1942). Now question is raised over problems that have been uncovered in three other centers within the genus, viz. (1) *L. Hitchcockii*, (2) *L. occidentalis*, and (3) *L. Kingii*. Consideration of them will follow in order.

LESQUERELLA HITCHCOCKII Munz

Two populations in *Lesquerella*, both of such similar morphological character as to demonstrate a close consanguinity, but each of restricted and independent physiographic range, have been established as species. One of these is from the Charleston Mountains and the nearby Sheep Range in the Mohave Desert, Clark County, Nevada, and has been called *L. Hitchcockii* (Munz, 1929, p. 163), and the other from the Paunsauquint Plateau in Garfield and Piute Counties, Utah, as *L. rubicundula* (Rollins, 1941, p. 178).

Subsequently, the writers made two collections from the Great Basin, in still another physiographic region, in the Quinn Canyon Range, Nye County, Nevada, and thus revealed a third population that is closely related to the two above. These and further specimens of *L. rubicundula* collected from its type locality, Red Canyon, have made necessary a more detailed consideration of the most probable relationship that obtains among the three populations.

Rollins (loc. cit.) has ascribed differences between *L. Hitchcockii* and *L. rubicundula* as follows: "Our plant differs from *L. Hitchcockii* in having much shorter styles; longer, linear instead of obovate or spatulate leaves; and sessile instead of subsessile fewer siliques. The siliques of *L. rubicundula* are ruddy, but not a deep red as in *L. Hitchcockii*."

From the additional material now available, appraisal of Rollins' conclusions is largely confirmatory; there are significant style and leaf differences, but a short stipe seems to be consistently developed in both populations, and silique color seems to be of negligible importance.

The third population, that from the Quinn Canyon Range, is the most robust of the three, having larger leaves, flowers, and fruits, with the last in addition, oblong-elliptic rather than subglobose. Closer affinity apparently lies with *L. rubicundula*; indeed, some specimens vegetatively are hardly separable from it. But on the other hand, broader-leaved plants are inseparable from the more lax specimens collected at the type station of *L. Hitchcockii*. In Table 1 are summarized the seemingly pertinent data

TABLE 1. SUBSPECIES OF *LESQUERELLA* HITCHCOCKII

	Subsp. <i>Hitchcockii</i>	Subsp. <i>rubicundula</i>	Subsp. <i>confuens</i>
Habit	Closely multicapital, branches short.	Closely multicapital, branches short, or branches few, becoming slender, elongate and rhizomatous.	Multicapital, but branches numerous, becoming rhizomatous.
Principal leaves	5-14 mm. long (av. 8.6), 1.7-4.2 mm. wide (av. 2.9), obovate, spatulate to oblanceolate, petioles abruptly formed and short, or less often equalling or exceeding the blade.	5-12 mm. long (av. 8.5), 1-2.2 mm. broad (av. 1.4), linear to oblanceolate, narrowed into a scarcely distinct petiole.	10-24 mm. long (av. 14.1), 1-3 mm. broad (av. 1.92), oblanceolate to nearly elliptic, the blade elliptic-oblanceolate, shorter than the petiole.
Leaf width-length ratio	1:2.8 av. ratio	1:6.0 av. ratio	1:7.4 av. ratio
Pedicels	3.5-5.0 mm. long (av. 3.3)	2.0-5.0 mm. long (av. 3.3)	3.0-7.0 mm. long (av. 3.9)
Sepals	3.7-5.2 mm. long (av. 4.5)	3.0-4.5 mm. long (av. 4.0)	4.0-6.5 mm. long (av. 5.7)
Petals	5.0-7.2 mm. long (av. 6.4)	4.0-8.5 mm. long (av. 6.8)	5.0-9.0 mm. long (av. 8.0)
Silique	Substipitate, subglobose, 3.0-5.5 mm. long (av. 4.0)	Substipitate, or sessile, subglobose, 2.5-4.5 mm. long (av. 3.8)	Substipitate, oblong-elliptic, 3.5-6.0 mm. long (av. 4.8)
Style	2.7-5.5 mm. long (av. 3.5)	1.7-3.7 mm. long (av. 3.2)	3.5-6.0 mm. long (av. 4.8)
Range	"Broken rocks" at timberline, Charleston Mountains; Sheep Range, Clark County, Nevada.	Eroded clay-gravel slopes, Red Canyon; Panguitch, Garfield County, Utah.	Talus and loose gravelly slopes, Quinn Canyon Range, Nye County, Nevada.

obtained from careful measurement of the material at hand.

It seems clear, then, from the above considerations, that the three more or less distinct but intergradient regional populations constitute but a single polymorphic species.

KEY TO THE SUBSPECIES OF *L. HITCHCOCKII*

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| Leaves usually 2-4 mm. wide, 6-12 mm. long, spatulate to broadly oblanceolate, the blades abruptly or sometimes gradually narrowed into a short petiole; average leaf width-length ratio 1:2.8 .. | 1. <i>L. Hitchcockii</i>
subsp. <i>Hitchcockii</i> |
| Leaves usually 1-3 mm. wide, 10-20 mm. long, oblanceolate to nearly linear, narrowed into slender petiole equalling or longer than the blade; average leaf-width ratio 1:7.4..... | 2. <i>L. Hitchcockii</i>
subsp. <i>confluens</i> |
| Leaves mostly 1-2 mm. wide, 5-10 mm. long, linear to narrowly oblanceolate, hardly at all narrowed into a petiole; average leaf width-length ratio 1:6.0..... | 3. <i>L. Hitchcockii</i>
subsp. <i>rubicundula</i> |

1. *LESQUERELLA HITCHCOCKII* subsp. *Hitchcockii*. *L. Hitchcockii* Munz, Bull. Torrey Club 56: 163, 1929, as to type.

Type locality. High exposed ridges at 10500 ft., Charleston Mountains, Clark County, Nevada, September 1, 1927, *Jaeger & Hitchcock sine no.* (Pomona No. 45092).

Distribution. Known only from the Charleston Mountains and Sheep Range, Clark County, Nevada.

Representative specimens. Charleston Mountains: benches at 11000 ft., June 26, 1926, *Jaeger sine no.*; Kyle Canyon, July 22, 1930, *Goodman & Hitchcock 1685*. Sheep Range: dry creek bed and banks 7600 ft., Hidden Forest, June 10, 1940, *Alexander & Kellogg 1697*.

2. *LESQUERELLA HITCHCOCKII* subsp. *confluens* subsp. nov. Herba perennis multicapitalis, ramis numerosis ex rhizomatis, foliis anguste oblanceolatis vel sublinearibus 1-3 mm. latis, 10-24 mm. longis (med. 2.9×14.1 mm.), latitudine-longitudine rationibus mediis 1:7.4, siliculis oblongo-ellipticis substipitatis 3.5-6.0 mm. longis, stylis 3.5-6.0 mm. longis.

Type. Loose gravelly soil along little draws in open juniper and pinyon pine, 7000 ft., ridge north of Cherry Creek Pass, frequent, June 20, 1945, Quinn Canyon Range, Nye County, Nevada, *Maguire & Holmgren 25534* (New York Botanical Garden, Utah State Agricultural College).

Distribution. Known from only the Quinn Canyon Range by the type and a second collection: upper Cherry Creek, June 23, 1945, *Maguire & Holmgren 25590*.

3. *LESQUERELLA HITCHCOCKII* Munz, subsp. *rubicundula* (Rollins) comb. nov. *L. rubicundula* Rollins, Contr. Dudley Herb. 3: 178. 1941.

Type. Red Canyon, 2300 m., Powell National Forest, Garfield County, Utah, July 6, 1912, *W. W. Eggleston 8198* (Herb. Nat. Arboretum).

Distribution. Known only from red clay and gravelly banks in Garfield, and Piute counties, Utah.

Representative specimens. Gravel, 7000 ft., Maryvale, Piute County, June 6, 1894, *Jones 5404*; Panguitch, Garfield County, July 18, 1920, *Jones sine no.*; dry gravelly slopes in sparse yellow pine and pinyon pine, frequent, 7000 ft., $3\frac{1}{2}$ mi. east mouth Red Canyon, Garfield County, June 25, 1940, *Maguire 19075*, topotype; red limestone gravel slides, Red Canyon, Garfield County, June 7, 1947, *Ripley & Barneby 8544*.

LESQUERELLA OCCIDENTALIS S. Wats.

Two names, *Lesquerella diversifolia* Greene and *L. Cusickii* Jones, have generally, since their proposal, been accepted as representing distinct specific populations, however close they might be to the first recognized *L. occidentalis*. A brief historical review will facilitate a consideration of their proper status and relationship.

Watson (1885, pp. 353-354) described *Vesicaria occidentalis* from three collections which we now have before us: near Yreka, California, *E. L. Greene*, in 1876; Multnomah County, Oregon, *T. J. Howell*; and, White Bluffs of the Columbia, Washington Territory, *T. S. Brandegee*. The first of these, designated as the type by Payson (1922, p. 224), is a single specimen with essentially erect stems about 17 cm. high, coarsely sinuate leaves, and compressed pods. The other two, the Howell specimen deposited at Gray Herbarium, and the Brandegee specimen at the National Herbarium, are *Lesquerella Douglasii* (proposed by Watson three years later in 1888) and consequently are of no concern here. The name *L. occidentalis* therefore must rest on the type, the Greene specimen.

The type, unfortunately a much damaged specimen without caudex, consists of a crown of five apparently ascending fruiting stems from 11 to 17 cm. high with rather numerous oblanceolate coarsely sinuate leaves from 2 to 7 cm. long. It represents one of the less frequently collected biotypes, viz., plants of more or less erect habit. Two other collections from Lassen Peak passed Watson's review at the time. The first, *Lemmon 972* (Gray Herbarium) consists of two specimens, each a distinct biotype and both in early flowering stage, one with an elongate caudex and ascending stems, similar to the type of *L. occidentalis* but with entire leaves, the other with thicker short caudex, apparently decumbent branches and smaller entire leaves. The second collec-

tion, made by Mrs. Austin (Gray Herbarium), consists of small plants of uncertain habit, but are with mature fruit compressed in the manner of the type of *L. occidentalis*. These two collections are inscribed in Watson's hand "*Vesicaria Kingii* Watson—n.sp." and form part of the material upon which the name *Lesquerella Kingii* was based. They both, however, are part of the *L. occidentalis* complex and are greatly different from the Great Basin *L. Kingii* which has subglobose, frequently retuse pods.

More recent collections from the Siskiyou Mountains of California further demonstrate the variability of *L. occidentalis* in the type region: a collection from Marble Mountain at 8000 ft. elevation (*Chandler 1653*) consists of a series of plants with ascending branches like that of the type but for one specimen on the Gray Herbarium sheet in which the branches are decumbent. In all of these the leaves are large, entire, or once-toothed, except in the decumbent specimen. In this the leaves are smaller. A collection from Black Mountain near Marble Mountain at 6800 ft. (*Hitchcock & Martin 5305*) is a series of depressed heavy caudexed plants, of the *L. diversifolia* phase, as is a collection from Anthony Peak, Mendocino-Tehama County (*Eastwood & Howell 9859*).

Mention should be made of a Cusick collection (no. 2054), the printed label for which bears the indefinite locality, "Stein's [Steens] and southern Blue Mountains." All the plants of this well distributed series are vigorous, essentially erect plants with stems reaching 30 cm. in height, shallowly toothed or repand leaves some 8 cm. in length; likewise the exceedingly coarse specimen (*Peck 16012*), from Wheeler County, Oregon, is of the same habit with stems 25 cm. high, and large sinuate leaves 8 cm. long.

Specimens of diverse habit, prostrate or ascending, were until 1901 interpreted as *L. occidentalis*. At that time Greene (1901, p. 309), without reference to the older name proposed *L. diversifolia* based on *Cusick's* collection (2304) from the Wallowa Mountains, Wallowa County, Oregon, as "Small and rather slender perennial, caudex simple or with 2 or 3 short branches: tufted leaves small, all on rather slender petioles longer than the blade, this from round-ovate to ovate-hastate, rhombic-ovate and ovate-lanceolate, seldom one-half inch long, both faces canescently lepidote: racemose peduncles 2 to 4 inches long, decumbent or assurgent, floriferous at summit, below it conspicuously leafy-bracted, the bracts oblanceolate: calyx and ovaries lepidote; pods not seen." Four isotype sheets are before us (none with mature fruits). Those from the Washington State College (no. 11231) and the National Herbarium (no. 362551), and the New York Botanical Garden consist of plants that conform to the type description. The sheet from Gray Herbarium has three specimens, two "small and rather slender," but the third is a vigorous plant with a coarse woody root and a heavy caudex some 6 cm. long that indicate a duration of several years at least. The leaves reach a

length of 7 cm. and the procumbent or flexuous flowering shoots a length of 15 cm.

Numerous subsequent collections demonstrate considerable diversity and intergradation in habit, in duration, size and form of leaf, and in pod size. Habits range from small, few-stemmed depressed plants of short duration to large, coarse many-stemmed long-lived, large-caudexed specimens, or even to individuals with ascending stems as in the three following collections from the John Day Valley, Grant County, Oregon (*Cusick 3258*, *Gale 154*, and *Peck 19894*).

One further name comes under consideration, *L. Cusickii* Jones (Jones, 1908, p. 2). The well distributed type series from "white 2567", are all immature plants in flower and without a well developed perennial caudex. They are without fruit, but by general similarity of form (not always dependable in *Lesquerella*) and locality, there is little doubt that they belong to the *L. occidentalis* complex. Plants of similar habitat from banks of Otis Creek, Malheur County (*Leiberg 2337*), or from Fossil, Gilliam County (*Leiberg 130*), both cited by Payson (1922, p. 225) as *L. Cusickii*, are more or less coarse than the type series but show varying degrees of persistence.

But numerous collections show limited duration and exhibit diversity in habit, habitat, and range, as: *Maguire & Holmgren 25649*, stony slopes, Magruder Mountains, Esmeralda County, Nevada, tiny depressed plants hardly to be recognized as perennial; *Gale 154*, dry ground, Grant County, Oregon, already cited above as transitional between the more or less erect *L. occidentalis* type and the depressed *L. diversifolia* type; or *Thompson 11339*, dry rocky sagebrush, Wheeler County, Oregon, an extensive series of plants with coarse heavy caudexes at one end of the series, but with roots that scarcely seem perennial at the other.

In summary, it is abundantly evident through study in the field, and the examination of eighty-eight herbarium specimens, that the plants going variously under the names *Lesquerella occidentalis*, *L. diversifolia*, and *L. Cusickii* constitute but a single variable assemblage consisting of several rather distinctive but completely intergrading populations. The prostrate or decumbent form designated by the name *L. diversifolia* is the most extensive and prevails throughout the entire range of the species. The more erect form exemplified by the type of *L. occidentalis* (the oldest and therefore proper name for the assemblage) is considerably less frequent, and is probably the expression of more favorable habitat, but is apparently restricted to the northwestern part of the general range. Juvenile plants of both forms appear to be annuals or short-lived perennials. Plants of short duration and moist calcareous clay or sand habitats seem to be confined to low altitudes in southeastern Oregon, eastern Nevada and northwestern Utah.

Type. Barren calcareous gravel-clay talus at 7200 feet altitude, White Pine Mountains northeast of Hamilton, White Pine County, Nevada, *Ripley & Barneby 9295* (New York Botanical Garden).

Additional specimen. Nevada. Elko County: East Humboldt Mountains [Ruby Range], 10,000 feet altitude, August 1868, *S. Watson 82* (New York Botanical Garden). This specimen bears the same number as does the type of *L. Kingii* from the West Humboldt Range, Pershing County, Nevada, dated June, 1868.

This collection by Ripley and Barneby from east-central Nevada represents a strongly cinereous biotype with small leaves and small pods. The elongated branches have resulted from the plant's being imbedded in loose talus, a not uncommon phenomenon. These specimens seem to represent a good ecologic and possibly also a local variety of restricted distribution.

3. *LESQUERELLA OCCIDENTALIS* subsp. *Cusickii* (Jones) stat. nov. *L. Cusickii* Jones, Contr. West. Bot. 12: 2. 1908.

Type. White clay hills of Willow Creek, Malheur County, Oregon, *Cusick 2367*.

Distribution. Calcareous clay, central-eastern Oregon, White Pine County, Nevada, and Box Elder County, Utah.

3a. *LESQUERELLA OCCIDENTALIS* subsp. *CUSICKII* var. *parvifolia* var. nov. Plantae valde cinereae; foliis spathulatis, laminis orbicularibus diam. 3–5 mm., petiolis 5–8 mm. longis.

Type. Low calcareous hills, 10 miles south of Majors, White Pine County, Nevada, 6000 feet altitude, June 17, 1944, *Ripley & Barneby 6313* (New York Botanical Garden).

Additional specimens. Nevada. White Pine County; calcareous gravel slopes near Shoshone, *Ripley & Barneby 3540* (immature).

Far out of its previously known range, the Nevada population of subsp. *Cusickii* is a symmetrical, conspicuously ash-gray weak perennial with much smaller leaves than is characteristic for the more northern plants.

LESQUERELLA KINGII S. WATS.

Maguire (1942) described a rosette-forming crucifer (from the high central Utah plateau) with obovate or obcordate and obcompressed pods as *Lesquerella hemiphsaria*. Commenting on the significant pod form, he wrote: "The striking emarginate condition obtains nowhere else in the genus." Hardly had that paper been submitted for publication when Holmgren (no. 829) collected a lax sprawling plant with decumbent branches and immature but obcordate pods in Elko County, Nevada. During the season of 1944, likewise in Elko County, Ripley and Barneby (no. 6220) collected similar but more physarioid plants with essentially mature obcordate obcompressed pods, and in the following year they collected a similar plant in northeastern Nevada. In 1945

Maguire and Holmgren obtained an extensive and diversified series of seventeen collections extending from east-central Nevada to Mono County, California, from about 5500 feet to over 12,000 feet altitude.

Plants of high altitudes have more or less compact rosettes and globose, obcordate pods 2–4 mm. long and 2.5 mm. broad, which are scarcely to strongly obcompressed. The type collection of *Physaria cordiformis*, a species recently proposed by Rollins (1950), must be placed here, although it is actually intermediate to low elevation forms.

Plants of intermediate altitudes are lax, forming less compact rosettes with fewer, longer, sprawling or ascending branches and larger leaves. The pods are larger, usually more inflated and in some specimens almost spherical; but, characteristically, they are obovate and more or less obcompressed and obcordate. The type collection of *Lesquerella Kingii* belongs here.

Plants of low altitudes, that is of valley benches and floors, are similar in habit but are often coarser. In this phase the pods reach maximum size, as much as 5 mm. long and 7 mm. broad, and are usually obcompressed and obcordate with a broad sinus, but are sometimes merely obovate. In extreme forms the pods are conspicuously obcompressed. Particularly if the specimens collected are a bit young, the wall of the pods tend to contract on drying, accentuating the flatness and the external prominence of the replum ridge.

Plants at one end of the series are altogether lesquerelloid. Plants at the other end of the series, at low altitudes, are strongly physarioid, that is with respect to *Physaria Geyeri*. Thus, the series connects *Lesquerella Kingii* with *Physaria Geyeri*, completely transcending morphological distinction between these representatives of presumably distinct genera. So compelling was this transition in its genetic and phyletic implication that the writers were led to discuss the problem in a paper read before the Boston meetings of the American Botanical Society (1947), titled "The Congeneric Aspects of *Lesquerella Kingii* and *Physaria Geyeri*."

Intergradation between *Physaria Geyeri* and *Lesquerella* has long been recognized. Rollins (1950, p. 46) concluded that "the assumed gap between these genera [*Lesquerella* and *Physaria*] has been completely closed insofar as the morphology of the various entities involved is concerned. There remains the slender evi-

¹ Since this paper was submitted to the editors, Doctor Jakowska has published two studies, one of which further discusses the nuclear morphology of *Physaria australis*, *P. Geyeri*, and *Lesquerella Forwoodii*; and earlier, the other which describes trichome development and morphology of the same species.

Jakowska, S. The trichomes of *Physaria Geyeri*, *Physaria australis*, and *Lesquerella Forwoodii*: development and morphology. Bull. Torrey Club 76: 177–195. 1949.

Idem. The resting nucleus in *Physaria* and *Lesquerella*. Bull. Torrey Club 78: 221–226. 1951.

dence from cytology which is, to say the least, incomplete." In continuing discussion, Rollins has emphasized the haploid chromosome numbers known in *Lesquerella* to be 5, 6, 8, and 9 (to us, a most engaging aneuploid series), while in three species of *Physaria* the number is 4. In conformity with this pattern, observations of Doctor Jakowska¹ indicate that the diploid number for *Physaria australis* and *P. Geyeri* is 8, and for *Lesquerella Forwoodii*, 10.

The somatic chromosomes of *Physaria australis* are shown by her to be relatively massive, those of *P. Geyeri* to be small and apparently structurally similar to those of *Lesquerella Forwoodii*. Though there is little evidence, we wonder whether in this group chromosome morphology may not be more significant than chromosome number, and whether 4 may not also be basic in the aneuploid chromosome series for *Lesquerella*. If so, it is possible that *Physaria Geyeri* (and perhaps also *P. oregana*) may be generically allied with *Lesquerella*, most closely to *L. Kingii*, and not with *Physaria*.

Physaria cordiformis was recently proposed by Rollins (1950) based on a collection (*Alexander & Kellogg 4393*) from Mineral County, Nevada, at 9300 feet elevation. The type is a vigorous annual with numerous profusely flowering and fruiting branches, definitely lesquerelloid in habit. Rollins described this species as improbably a perennial, but some plants of the population certainly persist for more than one growing season. The pods are obcordate and obcompressed, the largest about 4 mm. long and 5 mm. broad. They are possibly a little past maturity, since the walls apparently were more inflated but have become partly or strongly deflated, often leaving a ridge in evidence of the more rigid replum. The isotype (University of California Herbarium no. 736089) consists of three specimens. The largest is the most luxuriant of the type series. It is nearly identical with the type specimen, except that the pods are not so strongly obcompressed, but are more conspicuously inflated much as in *Lesquerella hemiphsaria*. A comparison of the type of *Physaria cordiformis* with the series of plants collected at higher altitudes in the Toiyabe, Toquima, and Monitor ranges, Nye County, Nevada, and the White Mountains, Mono County, California, demonstrates that all are, without doubt, congeneric.

The paratypes of *Physaria cordiformis* (*Holmgren 829* and *Ripley & Barneby 6200*) are low-altitude plants. They display a more lax habit, and have larger leaves and larger broader pods, 6 mm. long and 7 mm. wide, strongly flattened, this obviously accentuated by pressing and drying.

KEY TO THE VARIETIES OF LESQUERELLA KINGII

Plants lax, few branched; leaves usually broadly spatulate (sometimes narrowly so in var. *nevadensis*); pods 3-5 mm. long, 4-6 mm. broad.

Pods subglobose to obcordate and obcompressed, inflated, usually not conspicuously compressed, the sinus narrow; plants of intermediate latitudes

1. *L. Kingii*
var. *Kingii*

Pods obcordate to obcompressed, conspicuously flattened but also somewhat inflated, the sinus relatively broad; plants of lower altitudes

2. *L. Kingii*
var. *nevadensis*

Plants more closely rosette-forming; leaves more often narrowly spatulate to oblanceolate; pods 2-4 mm. long, 2-5 mm. broad, subglobose or obcordate and obcompressed, the sinus relatively narrow, or the pod truncate or merely obtuse; plants of high altitudes

3. *L. Kingii*
var. *cordiformis*

1. *LESQUERELLA KINGII* var. *Kingii*. *Vesicaria Kingii* S. Wats. Proc. Am. Acad. 23: 251. 1885, as to type.

Type. West Humboldt Mountains, Pershing County, Nevada, June, 1868, *S. Watson* 82 (Gray Herbarium; isotype, New York Botanical Garden).

Distribution. Foothills and slopes, 6500 to 9500 feet altitude, White Pine and Pershing counties south to Lincoln and Nye counties, Nevada.

Representative specimens. NEVADA. Esmeralda County: Cherry Creek Pass, Quinn Canyon Range, *Maguire & Holmgren* 25533; pods spheroid to mostly obovate, 3 miles west of Cherry Creek Summit, *Maguire & Holmgren* 25548. Lander County: Kingston Canyon, *Goodner & Henning* 195. Nye County: Mohawk Canyon, 7500 feet, Toiyabe Range, *Maguire & Holmgren* 25429; pods truncate or slightly retuse, Mohawk Canyon, *Maguire & Holmgren* 25685; pods somewhat flattened contrary to the partition, rounded, truncate or slightly retuse, Indian Valley, 7000 feet, *Maguire & Holmgren* 25671; pods truncate to retuse, Stewart Creek, 9500 feet, *Maguire & Holmgren* 25915. Pershing County: West Humboldt Mountains, silicles globose, above Unionville, 6600 feet, *Ripley & Barneby* 5620. White Pine County: calcareous gravel, 6 miles north of Ely, *Ripley & Barneby* 6271A.

The collection by Ripley and Barneby (no. 5620) from the type locality, though immature, helps to fix the identity of the still-less-mature type (*Watson* 82). There now remains no reasonable doubt that the type collection represents the widespread middle-altitude phase of the species. Indeed, no related species is known to occur in the area. *Lesquerella latifolia* (with which *L. Kingii* merges in Lincoln County, Nevada) with pods longer than broad, occurs to the south in the region transitional to the Mohave Desert; *L. Barnebyi*, with short obovate non-obcordate pods and different habit, is known only from White Pine County.

2. *LESQUERELLA KINGII* var. *nevadensis* var. nov. Plantae annuae vel subperennes; caulibus prostratis vel procumbentibus;

laminis foliorum oblanceolatis vel rhomboideis, aliquando cum dentibus lateralibus; siliculis 4–6 (7) mm. latis, 3–5 mm. longis, obcompressis, obcordatis vel late obovatis, truncatis, aliquantum inflatis; sinibus latis; stylis 3.0–4.5 (5.0) mm. longis.

Type. Frequent, sandy, gravelly soil, associated with *Artemisia tridentata*, bench 3 miles east of Reese River Range Station, road to Mohawk Canyon, Toiyabe Range, 6800 feet altitude, Nye County, Nevada, June 14, 1945, *Maguire & Holmgren 25418* (New York Botanical Garden; isotype, Utah State Agricultural College).

Distribution. Foothills and valleys, 5000 to 6800 feet altitude, Nye County, Nevada to Twin Falls County, Idaho.

Representative specimens. NEVADA. Elko County: 30 miles east of Wells, *Train 3665*; 55 miles south of Elko, *Holmgren 829* (paratype of *Physaria cordiformis*); 10 miles north of Currie, *Ripley & Barneby 6445* (canescent form); Pequot Range, *Ripley & Barneby 4611*. Eureka County: Lone Mountain 18 miles west of Eureka, *Ripley & Barneby 6220* (paratype of *Physaria cordiformis*). Nye County: Toiyabe National Forest, *Maguire & Holmgren 25418, 25430, 25474, 25684*. Collections by Ripley and Barneby from 22 miles north of Wells, Elko County, Nevada (*6461*), and from 10 miles south of Rogers, Twin Falls, Idaho (*6467*) are part of a series connecting var. *nevadensis* with *Physaria Geyeri*; but they are more silimar to typical plants of the latter.

The variable var. *nevadensis* on the one hand passes freely into var. *Kingii* and on the other approaches or even transcends (through *Physaria Geyeri*) the line between *Lesquerella* and *Physaria*. The varietal epithet was adopted from a name on the label of *Ripley & Barneby 6220*.

3. LESQUERELLA KINGII var. *cordiformis* (Rollins) stat. nov. *Physaria cordiformis* Rollins, Contr. Gray Herb. 171: 47. 1950.

Densely rosette-forming with numerous procumbent densely flowering branches; basal leaves broadly to narrowly spatulate or oblanceolate; pods obcordate and obcompressed to obovate or globose, usually inflated, often rounded, 2–4 mm. long, 2–5 mm. broad; style 3–5 mm. long.

Type. In road, branch of Cat Creek, 9300 feet altitude, Wassuk Range, Mineral County, Nevada, July 8, 1945, *Annie M. Alexander & Louise Kellogg 4393*. Gray Herbarium; isotype, University of California no. 736089.

Representative specimens. CALIFORNIA. Mono County, White Mountains: Blank Mountain, 10,500 feet, *Maguire & Holmgren 26052*; flowers white, Crooked Creek, *Maguire & Holmgren 26056, 26124*; flowers yellow, 12,000 feet, *Maguire & Holmgren 26084*; Campito Meadow, 10,800 feet, *Maguire & Holmgren 26120*. Nevada, Mineral County: Cat Creek, Wassuk Range, 9300 feet, *Alexander & Kellogg 4393* (type of *Physaria cordiformis* Rollins); Mt. Montgomery Pass, 8600 feet, *Train 4006*. Nye County: Barley

Creek, Monitor Range, 9800 feet, *Maguire & Holmgren 25693*; Pine Creek, Toquima Range, 10,000 feet, *Maguire & Holmgren 25824*.

The New York Botanical Garden, New York,
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AQUATIC PLANTS IN OZETTE LAKE, WASHINGTON

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Many of the smaller glacial lakes of the lowlands of western Washington occupy partly filled depressions with peaty margins and soft oozy bottoms which do not provide a favorable substrate for many rooted aquatic plants. Ozette Lake, which lies within two miles of the Pacific Ocean in the Olympic Peninsula, Clallam County, differs in that it has a firm sandy or stony bottom and several shallow bays. The areas which are somewhat protected from the direct action of the prevailing westerly winds support a luxuriant aquatic vegetation of both emersed and submersed species. That the aquatics of Ozette Lake have not been neglected as much as those of most lakes is attested by the collections of I. C. Otis, J. W. Thompson, and G. N. Jones, cited by Jones (1936) in his survey of the Olympic Peninsula flora.

Scheffer and Hotchkiss (1945) have compared the distribution of fifty-one species of aquatic plants from ten glacial lakes in western Washington. They list only twenty-two species from Ozette Lake. All of these except *Scirpus validus* Vahl were observed in July, 1950. The following species are additions to their list for Ozette Lake:

**LYCOPodium inundatum* L. On sandy boggy shore near the outlet.

ISOETES echinospora Dur. var. *BRAUNII* (Dur.) Engelm.

ISOETES piperi A. A. Eaton.

* Not reported by Jones (1936) from the Olympic Peninsula.